

TWO NEW SPECIES OF WOOD-BORING *LIMNORIA*
(CRUSTACEA: ISOPODA) FROM NEW ZEALAND,
L. HICKSI AND *L. RENICULUS*

Marilyn Schotte

Abstract.—*Limnoria hicksi* is described and distinguished from *L. indica* Becker & Kampf, 1958 by the structures on the fifth pleonite and the pleotelson. *Limnoria reniculus*, similar to *Limnoria foveolata* Menzies, 1957, *L. saseboensis* Menzies, 1957, *L. sexcarinata* Kühne, 1975 and *Limnoria sublittorale* Menzies, 1957, differs from all four in the structure of the fifth pleonite, pleotelson and morphology of the lacinoid seta of the right mandible.

At present only two reliably identified wood-boring isopods of the genus *Limnoria* have been reported from New Zealand. These are *L. quadripunctata* Holthuis from Portobello (Hurley 1961), Auckland Harbour (McQuire 1964), and Port Nicholson (Ralph & Hurley 1952), and *L. tripunctata* Menzies, also from Auckland Harbour (McQuire 1964). Menzies (1959) listed *L. quadripunctata* site records for isopods he examined from Auckland, Wellington, and Napier, previously thought to be specimens of *L. lignorum* (Rathke). Chilton (1914) had assigned the latter name to wood-borers found in timbers in Auckland and Lyttleton harbors and in piles from Akaroa Harbour. The latter isopod, whose name was assigned to most limnoriids before Menzies' 1957 monograph, has an Arctic-boreal distribution and has been reliably reported only in the Northern Hemisphere from 39° to 58°N and from Iceland (Menzies 1957). Two alga-borers have been found in New Zealand, *Phycolimnoria stephenseni* Menzies, in floating *Lessonia* near Auckland Island (also Macquarie Island), and *P. segnis* (Chilton) from seaweed in Lyttleton and Akaroa harbors (Menzies 1957) as well as from Portobello (Hurley 1961).

Across the Tasman Sea, *Limnoria quadripunctata* has been found recently in Australia at Goat Island and Sydney Harbour

in association with *L. indica* and *L. tripunctata* Menzies, as well as in Tasmania (Cookson 1987). Hale (1929) reported *L. lignorum* from Port Lincoln but this identification is undoubtedly erroneous. *L. sublittorale* Menzies has been collected from New South Wales (Menzies 1957), as has *Phycolimnoria rugosissima* Menzies. An additional alga-borer, *P. nonsegnis* Menzies from Tasmania, brings to eight the total number of limnoriids thus far known from the Australia-New Zealand region.

Material of the new species has been deposited at the National Museum of New Zealand in Wellington and the National Museum of Natural History, Smithsonian Institution, Washington, D.C.

Family Limnoriidae

Limnoria (Limnoria) hicksi, new species
Figs. 1A-D, 2A-F, 3A-E

Material.—Holotype, NMNZ Cr. 5702, ♀ tl 4.0 mm, Paratype, USNM 205960, ♀ tl 3.3 mm (on slide and SEM stub), stn K6 R/V *Kalinovo*, 177°39'05"E, 37°23'07"S to 177°36'06"E, 37°23'07"S, off New Zealand, 1075-1100 m, in rotting wood, 23 Nov 1981, coll. G. R. F. Hicks.

Description.—Female: Pigment absent. Pleonite 5 with a row of four proximal tubercles and two somewhat larger distal tu-

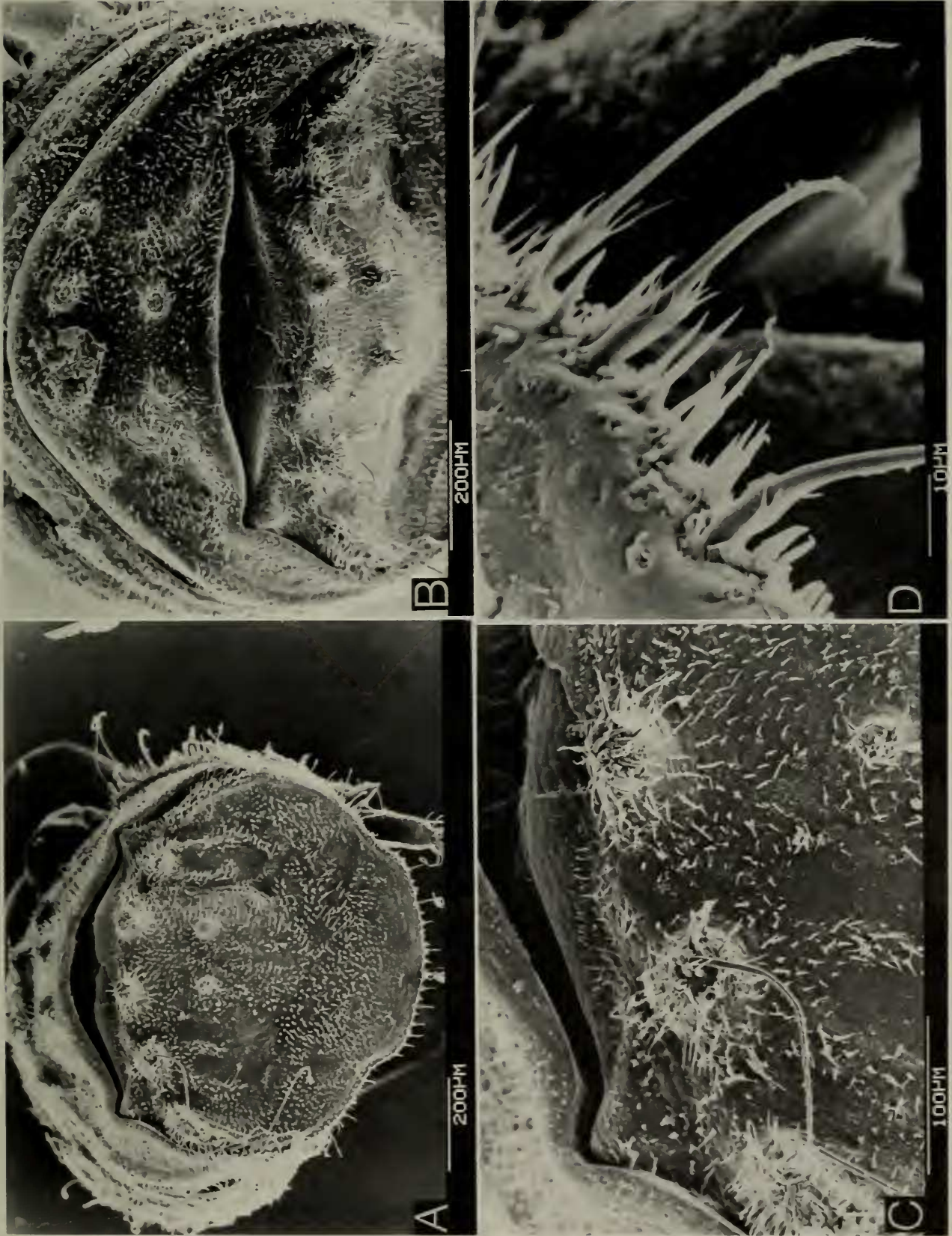


Fig. 1. *Limnoria hicksi*: A, Pleotelson; B, Fifth pleonite and anterior pleotelson; C, Tubercles at base of pleotelson enlarged; D, Spination on distal margin of pleotelson.

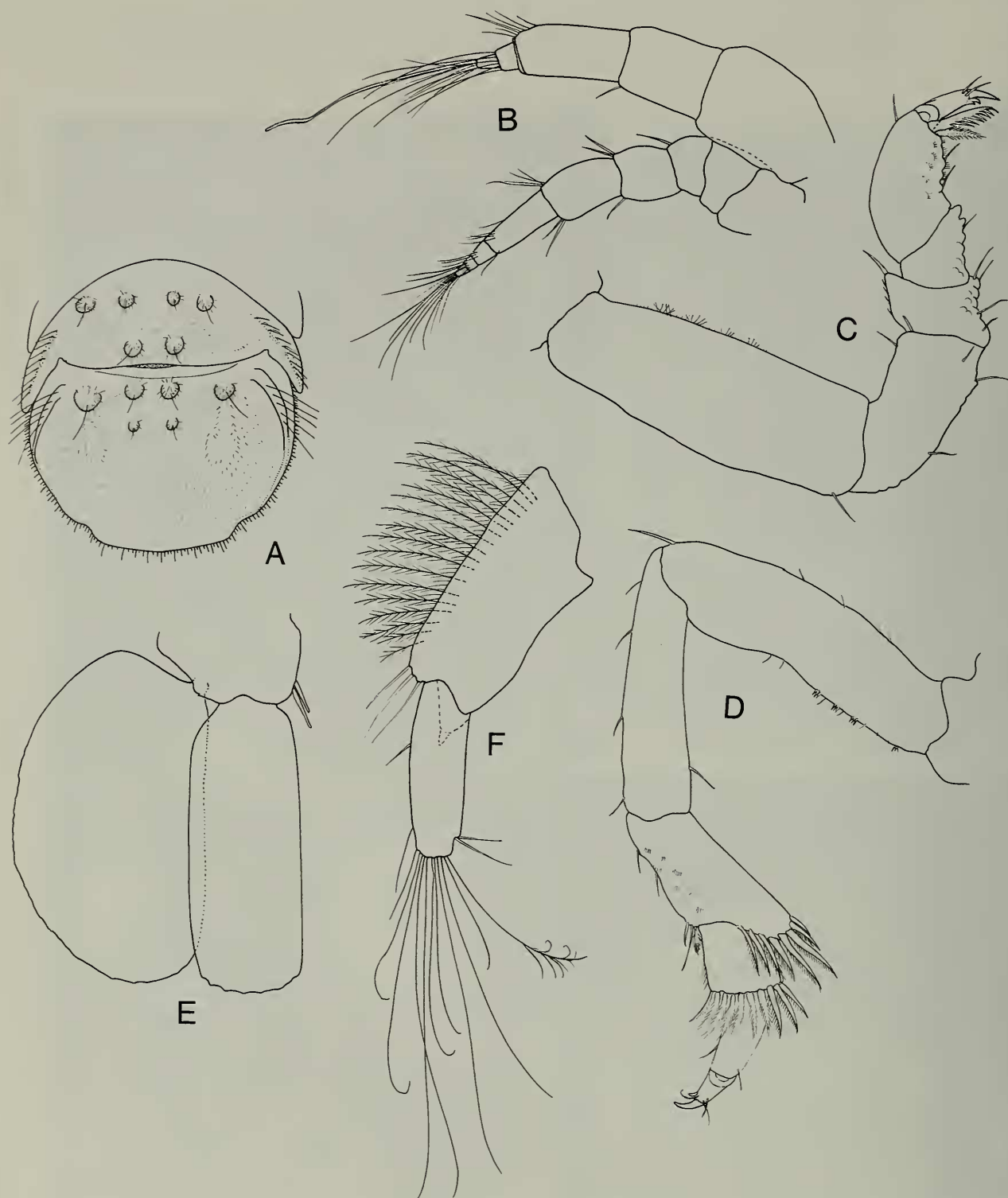


Fig. 2. *Limnoria hicksi*: A, Fifth pleonite and pleotelson; B, Antennule and antenna; C, First pereopod; D, Seventh pereopod; E, First pleopod of female; F, Uropod.

bercles, all bearing short spinules. Lateral crests of pleonite 5 with long setae. Pleotelsonic margin not evenly rounded but with pair of shallow symmetrical notches in posterior third. Base of pleotelson with a row of four large tubercles and pair of smaller tubercles posterior to these, all spinose (Fig.

1C) and bearing at least one long seta. Lateral crests with long setae. Surface of pleotelson regularly spinulose except for bare patches lateral to posterior tubercles. Posterior margin not tuberculate but with both simple and sheathed spines (Fig. 1D).

Antennular peduncle of three articles, first

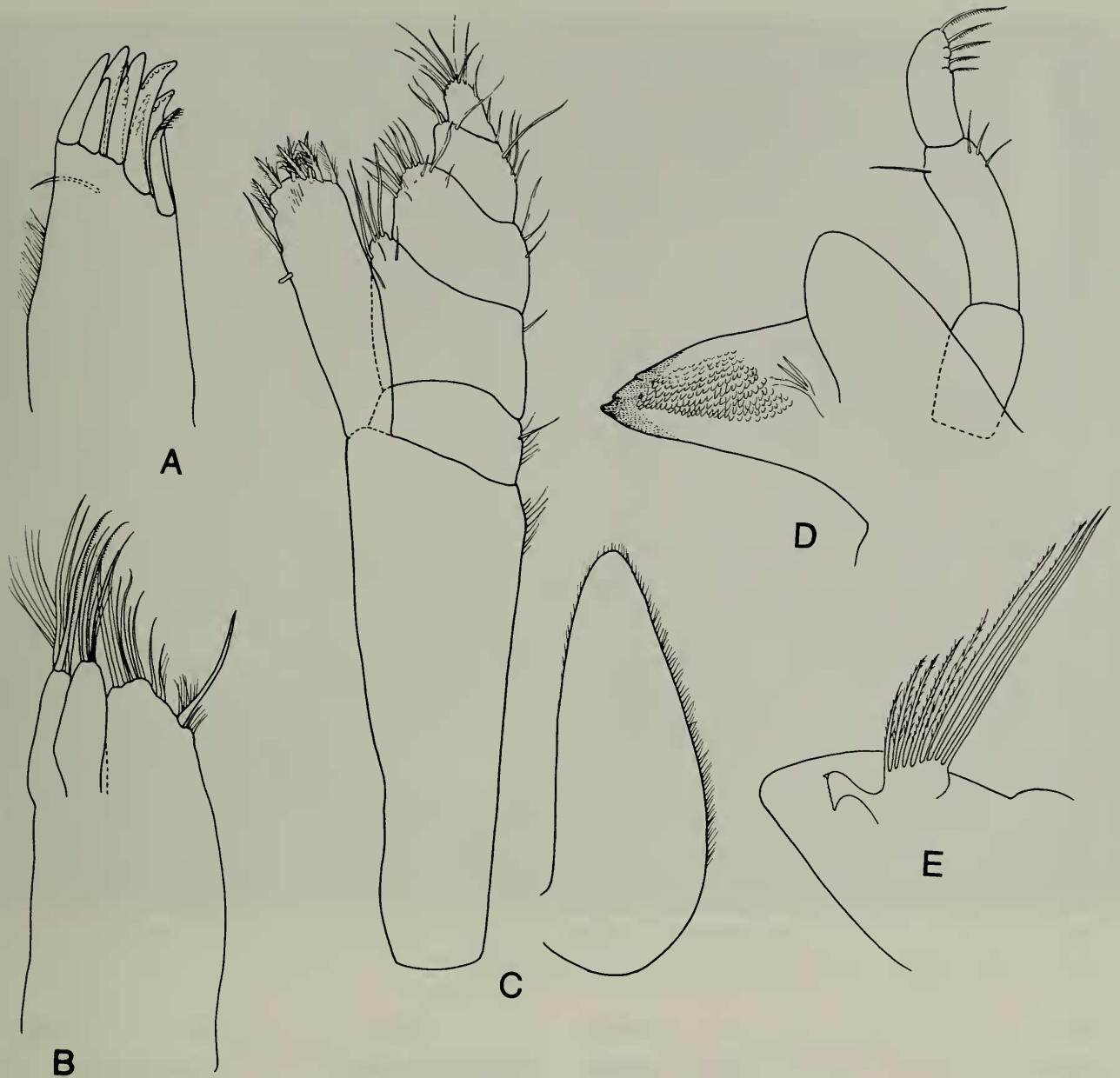


Fig. 3. *Limnoria hicksi*: A, Outer lobe of first maxilla; B, Second maxilla; C, Maxilliped; D, Left mandible; E, Lacinioid seta of right mandible.

and third articles subequal in length; flagellum consisting of one very short basal article and two subequal articles. Antennal flagellum of four articles, first article longer than three distal articles combined.

Mandibular palp of three articles, second article longest, terminal article bearing five distal fringed spines; "rasp" of left incisor strongly sclerotized; spine row of right mandible of nine lacinate spines, distal edge of lacinioid seta broad, very finely toothed and acute at ends. Maxilla 1 with nine stout setae, four of which provided with blunt teeth and one with setules. Maxilla 2 as figured.

Maxillipedal endite with single coupling hook and six setose spines on distal margin; articles 2 and 3 of palp subequal in length; epipod about three times longer than greatest width, not reaching distal margin of basipod.

Pereopod 1 with bidentate accessory spine at base of dactylar unguis; propodus with one dentate and one fringed posterodistal spine. Pereopod 7, accessory spine of dactyl small and apparently not bidentate; carpus with many fringed spines on distal margin; merus with anterodistal margin somewhat produced and bearing numerous fringed

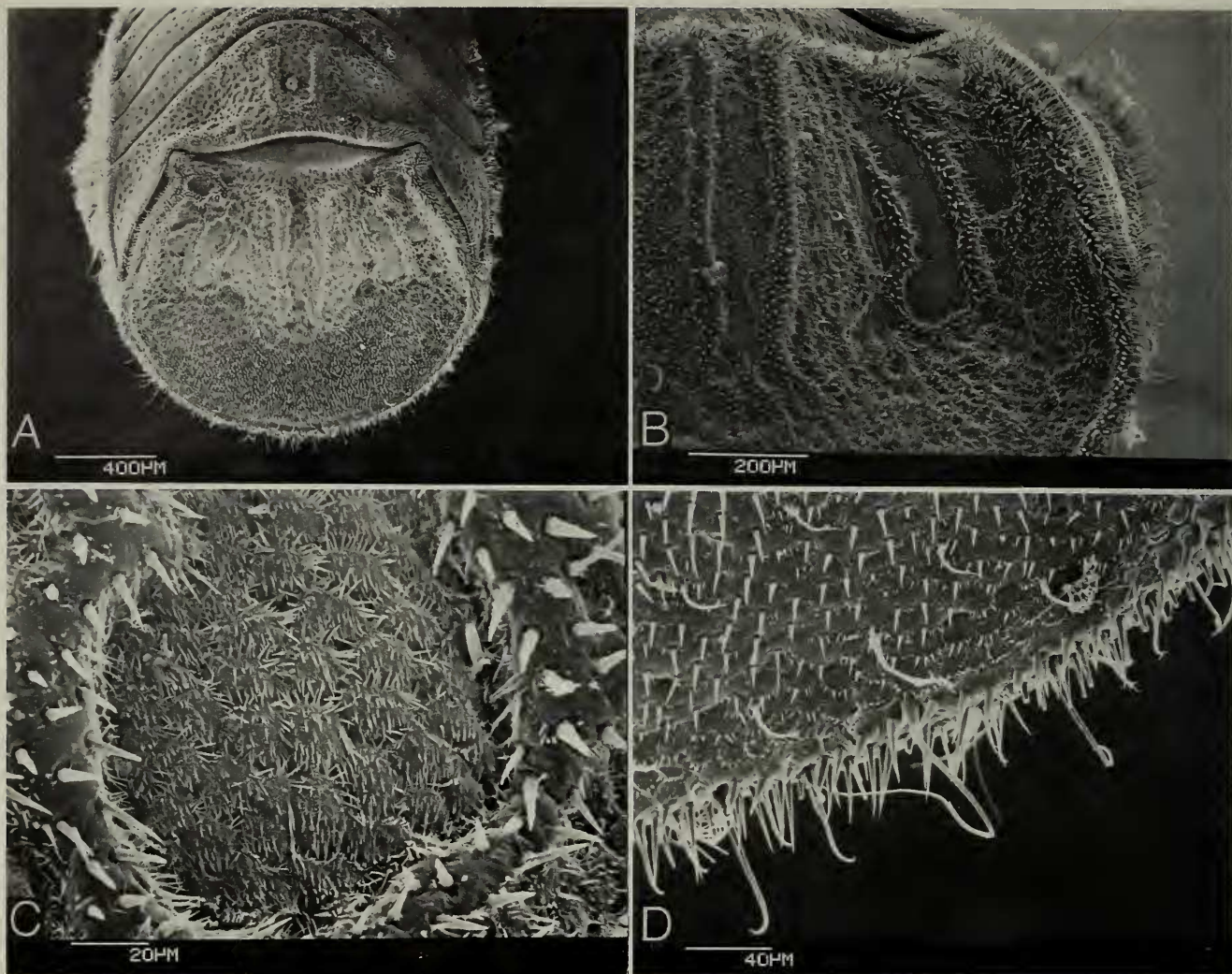


Fig. 4. *Limnoria reniculus*: A, Pleotelson and fifth pleonite; B, Pleotelsonic surface enlarged; C, Interior surface of kidney-shaped carina enlarged; D, Pleotelsonic margin.

spines visible in lateral view. Endopods of pleopods 1 and 2 of female distally truncate. Structure of male second pleopod unknown. Uropodal exopod less than one-half length of endopod; latter bearing one plumose seta and several terminal setae of varying lengths; peduncle with row of short, simple setae on outer margin and additional row of long plumose setae near margin.

Remarks.—The male of the sexually dimorphic *L. indica* is the only other known limnoriid with six basal tubercles on the pleotelson arranged similarly to those in *L. hicksi*. Instead of additional tubercles on the fifth pleonite, *L. indica* in both sexes possesses two subparallel longitudinal carinae bearing setae, thereby distinguishing it from *L. hicksi*.

Etymology.—The new species is named

for its collector, Dr. Geoffrey R. F. Hicks, National Museum of New Zealand, Wellington, New Zealand.

Limnoria (Limnoria) reniculus, new species
Figs. 4A–D, 5, 6A–G, 7A–E

Material.—Holotype, NMNZ Cr. 5703, ovig. ♀, tl 5.0 mm, Allotype, NMNZ Cr. 5704, ♂, 4.4 mm, Paratypes, NMNZ Cr. 5705, 11 ovig. ♀, 16 ♀, 15 ♂, South Taramaki Bight, North Island, New Zealand, R/V *James Cook*, sta J20/25/84, 40°56.4'S, 174°44.0'E to 40°59.8'S, 174°43.7'E, in rotting wood, 144–182 m, 29 Nov 1984, coll. G. R. F. Hicks. Paratypes, USNM 205961, 11 ovig. ♀, 15 ♀, 14 ♂, from same locality. Other material: USNM 205962, 1 specimen, South Taranaki Bight, New Zealand,



Fig. 5. *Limnoria reniculus*: Different specimen from same lot as specimen in Fig. 4, pleotelson and fifth pleonite.

sta J20/16/84, 40°33.0'S, 173°04.6'E to 40°31.7'S, 173°01.2'E, in rotting wood, 47–52 m, 28 Nov 1984, coll. G. R. F. Hicks.—USNM 205963, 5 specimens, sta J15/40/84, 40°33.4'S, 173°04.6'E to 40°32.4'S, 173°02.6'E, in rotting wood, 44–52 m, 28 Nov 1984, coll. G. R. F. Hicks.—USNM 205964, 11 specimens, sta J16/6/84, 37°51'S, 177°19'E to 37°51'S, 177°15'E, in rotting wood, 48–49 m, 17 Sep 1984, coll. G. R. F. Hicks.—USNM 205965, J15/22/84, 41 specimens, 42°21.6'S, 170°49.5'E to 42°24.4'S, 170°48.1'E, in rotting wood, 179–184 m, 3 Sep 1984, coll. G. R. F. Hicks.—USNM 205966, sta J15/40/84, 5 specimens, 42°59.4'S, 170°16.5'E to 42°57.2'S, 170°19.3'E, in rotting wood, 60–62 m, 5 Sep 1984, coll. G. R. F. Hicks.—USNM 205967, 6 specimens, sta J15/28/84, 42°45.8'S, 170°28.2'E, in rotting wood, 50–64 m, 4 Sep 1984, coll. G. R. F. Hicks.—USNM 205968, 3 specimens, sta J20/12/84, 40°46.7'S, 173°48.0'E to 40°47.9'S, 173°47.3'E, in rotting wood, 60–65 m, 27 Nov 1984, coll. G.

R. F. Hicks.—USNM 205969, 6 specimens, off North Island, New Zealand, R/V *James Cook*, sta J9/70/84, 38°02'S, 174°37'E to 38°06'S, 174°36'E, in rotting wood, 50–51 m, 3 Jun 1984, coll. G. R. F. Hicks.—USNM 205970, 3 specimens, sta J16/2/84, 37°39'S, 177°28'E to 37°39'S, 177°24'E, in rotting wood, 134–137 m, 17 Sep 1984, coll. G. R. F. Hicks.—USNM 205971, 8 specimens, New Zealand, off Cape Runaway, *Wanaka*, sta WK 3/19/85, 37°29.9'S, 177°47'E, in Log A, 450–481 m, 8 Dec 1985.—USNM 205972, 19 specimens, New Zealand, Bay of Plenty, east of Alderman Island, NMNZ Cr. 5152, from timber, 400–520 m, Jun 1969, coll. R. D. Cooper.—USNM 205973, 14 specimens, New Zealand, WNW White Island, Tumokemoke Knoll, R/V *Tangaroa* (NZOI sta R 76), 37°29.1'S, 176°54.7'E, in twig, 248–283 m, 20 Jan 1979.

Description.—Male: Dorsal integument of pereon and pleon rather foveolate, especially pleonite 5. Pleonite 5 with somewhat variable U-shaped carina (Figs. 4A and

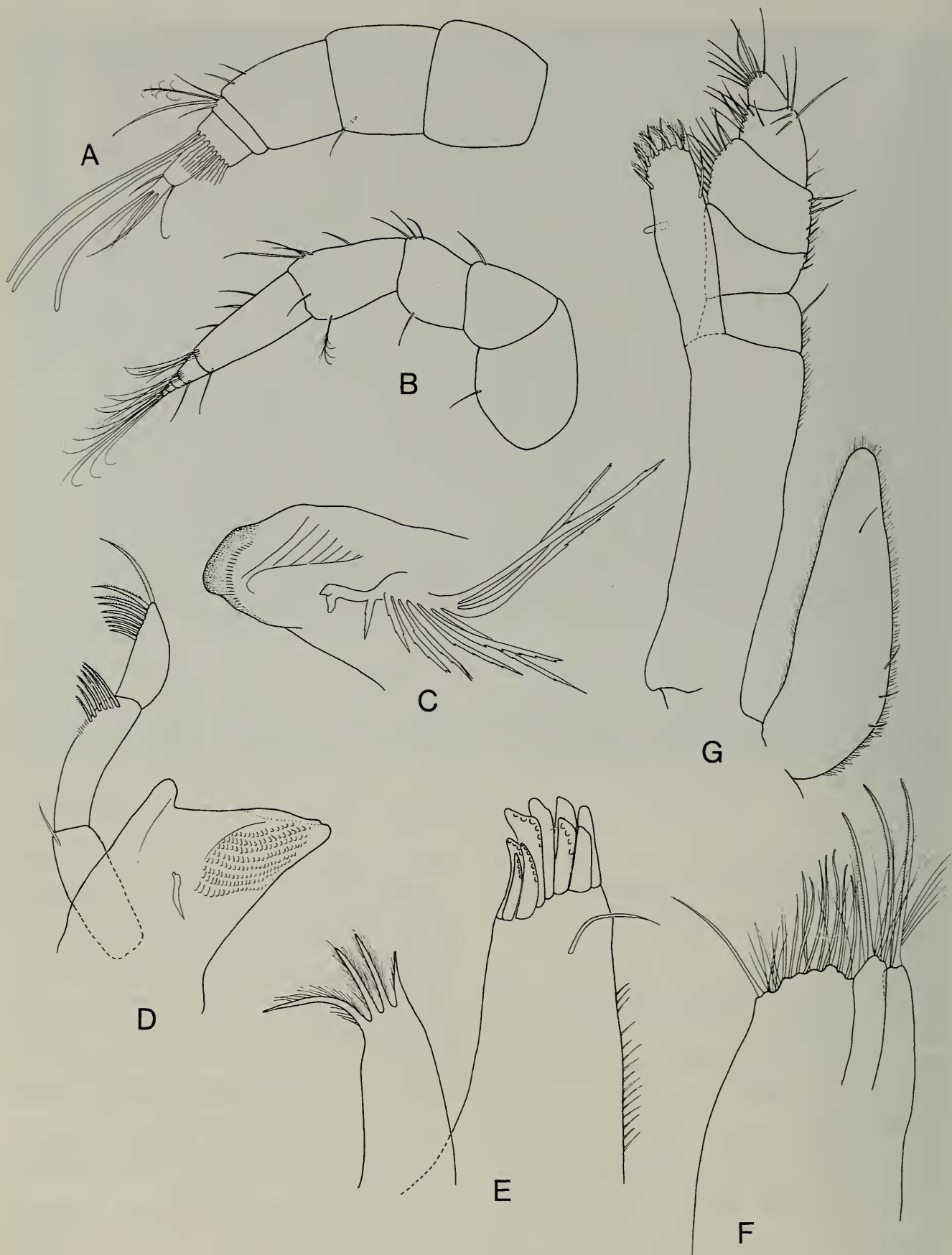


Fig. 6. *Limnoria reniculus*: A, Antennule of male; B, Antenna; C, Lacinioid seta of right mandible; D, Left mandible; E, First maxilla; F, Second maxilla; G, Maxilliped.

5). Pleotelson densely spinulose with two rounded submedian ridges basally, flanked on either side by irregular, kidney-shaped carinae, apparently bare interiorly but actually covered with tiny spinules (Fig. 4C). Submedian ridges becoming obsolete distally. Margins of pleotelson not tuberculate, having multiple rows of simple, unsheathed spines. Female dorsum as in male.

Antennular peduncle of three articles; flagellum of male consisting of basal article, much shorter than wide, penultimate article with many aesthetascs ringing distal margin, and terminal article half as wide as preceding article. Antennal flagellum of 4 articles, basal article longer than 3 distal articles together. Mandibular palp of 3 articles, two proximal articles subequal in length; article 2 with 6 distal fringed spines; terminal article bearing 9 distal fringed spines; spine row of left mandible a single process; spine row of right mandible of 10 lacinate spines, increasing in length proximally; lacinioid seta with two lobes, one elongate and blunt, the other short and jagged; incisor with strongly sclerotized cusp. Maxilla 1 and 2 as figured. Maxillipedal endite with single coupling hook, eight spines on distal margin, five of which setulose; palpal article 3 longest and widest; epipod more than three times longer than greatest width, distally rounded and not reaching base of palp. Pereopod 1, bidentate accessory spine at base of dactylar unguis; propodus with 1 dentate, plus one fringed posterodistal spine. Carpus and merus with short rows of rounded scales on posterior surface. Pereopod 7, accessory spine of dactyl barely bidentate; carpus with many fringed spines on distal margin; merus produced anterodistally, bearing many fringed spines encircling distal margin. Appendix masculina of pleopod 2 of male articulating proximal to mid-length on median margin of endopod, extending beyond ramus. Uropodal endopod elongate, about four times longer than wide and bearing five plumose setae and several lateral and terminal simple setae; uropodal

exopod a slightly curved claw; peduncle with row of setae inserted medially to lateral margin.

Remarks.—*L. reniculus* may be confused with *L. saseboensis* Menzies, which also has submedian longitudinal ridges on the pleotelson, especially if debris obscures the kidney-shaped carinae in uncleaned specimens of the former. The U-shaped carina on pleonite 5 in *reniculus* may vary but the subparallel ridges do not join proximally as they appear to do in *saseboensis*. Menzies' description notes the posterior edge of the pleotelson and lateral crests as tuberculate with "spike-like bristles on the margin." SEM photos (Fig. 4) do not reveal obvious tubercles in the present species. The two species also differ somewhat in the shape of the lacinioid seta of the right mandible with "two medially curved teeth at apex" in *L. saseboensis*. *L. sublittorale* Menzies from Australia also has a pair of longitudinal carinae on the telson but apparently lacks other surface ornamentation there. The lacinioid seta of the right mandible has two recurved teeth instead of a blunt lobe as in *L. reniculus*. *L. foveolata* Menzies, while also foveolate on the pleotelson and pleonite 5, has carinae on both segments which are more irregular than those in the new species, and it lacks the kidney-shaped features. The lacinioid seta of *L. foveolata* as figured by Menzies has three teeth at the apex.

The new species also resembles *L. sexcarinata* Kühne. Examination of type material of the latter species reveals the carina of pleonite 5 as "horseshoe-shaped" and the curving ridges on the pleotelson do not join distally. Kühne's (1975) description states that the lacinioid seta of the right mandible, apparently a good character for distinguishing members of this genus, is "branched and furnished at the end with teeth." SEM photos of *L. sexcarinata* show the presence of tubercles and sheathed spines on the pleotelsonic margin, neither of which exist in *L. reniculus*.

Etymology.—The Latin *reniculus* (little

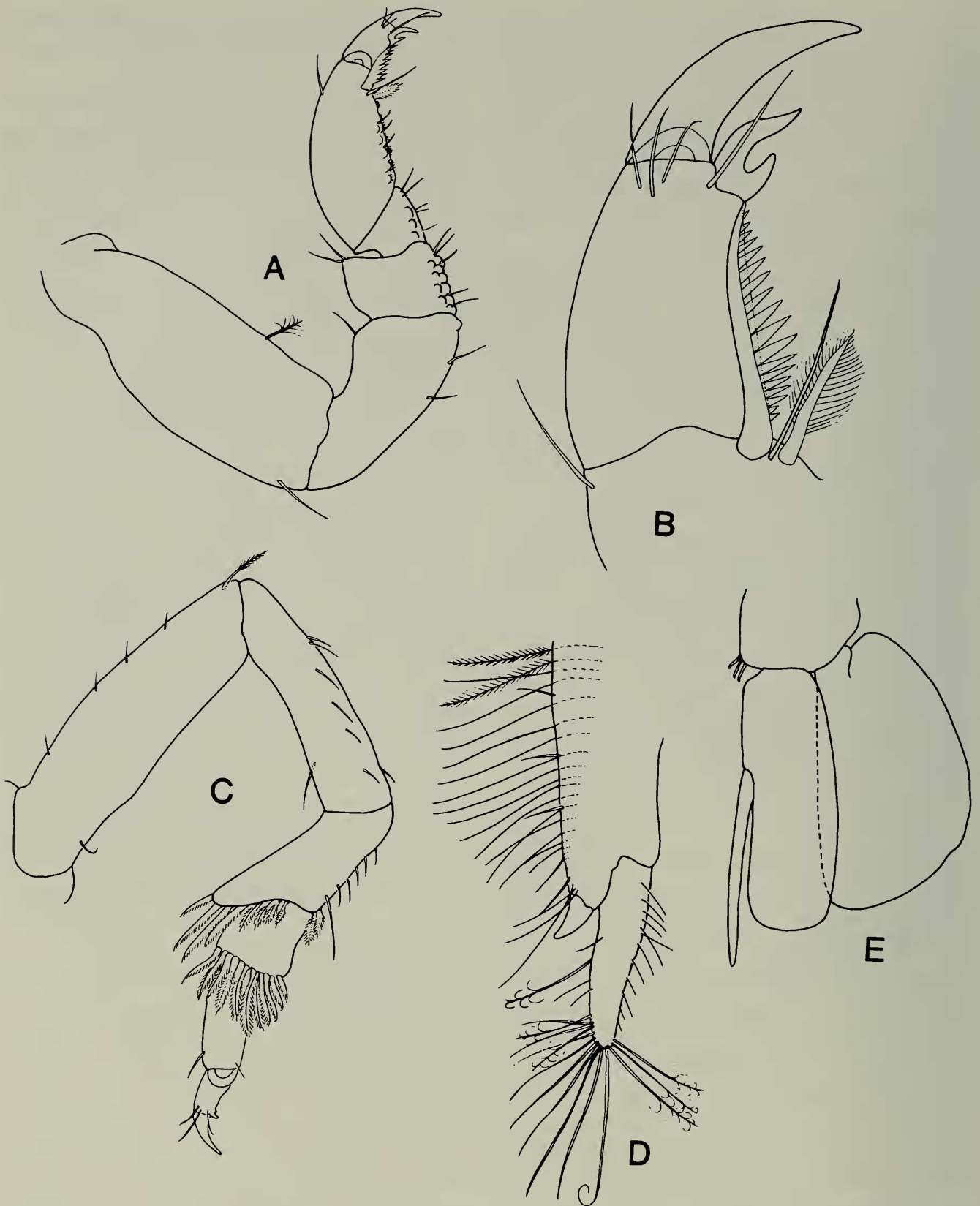


Fig. 7. *Limnoria reniculus*: A, First pereopod; B, Dactyl of first pereopod enlarged; C, Seventh pereopod; D, Uropod; E, Second pleopod of male.

kidney), proposed as a noun in apposition, refers to the shape of the outline of the carinae flanking middorsal ridges on the pleotelson.

Acknowledgments

Material described in this paper was kindly provided by Dr. Geoffrey R. F. Hicks of the National Museum of New Zealand. Mrs. Susann Braden of the NMNH assisted with preparation of the scanning electron micrographs. The manuscript benefitted from comments by Laurie Cookson and Brian Kensley, both of whom reviewed the manuscript.

Literature Cited

- Chilton, C. 1914. The species of *Limnoria*, a genus of wood-boring Isopoda.—*Annals and Magazine of Natural History*, Ser. 8, vol. 13:380–390.
- Cookson, L. J. 1987. The occurrence of *Limnoria indica* Becker & Kampf (Isopoda) on the eastern coast of Australia.—*Crustaceana* 52(1):85–89.
- Hale, H. M. 1929. The crustaceans of South Australia. 2:201–380, figs. 268–269. Government Printer, Adelaide.
- Hurley, D. E. 1961. A checklist and key to the Crustacea, Isopoda of New Zealand and the Subantarctic Islands.—*Transactions of the Royal Society of New Zealand, Zoology* 1(20):259–292.
- Kühne, H. 1975. Neubeschreibung einer holzzerstörenden Bohrrassel, *Limnoria sexcarinata* (Crustacea, Isopoda).—*Zeitschrift für angewandte Zoologie* 62:447–455.
- McQuire, A. J. 1964. A note on the occurrence of marine borers in New Zealand.—*Proceedings of the New Zealand Wood Preservers' Association* 4:35–44.
- Menzies, R. J. 1957. The marine borer family Limnoriidae (Crustacea: Isopoda).—*Bulletin of Marine Science of the Gulf and Caribbean* 7(2): 101–200.
- . 1959. The identification and distribution of the species of *Limnoria*. Pp. 10–33 in Dixie Lee Ray, ed., *Marine boring and fouling organisms*. University of Washington Press, Seattle.
- Ralph, P. M., & D. E. Hurley. 1952. The settling and growth of wharf-pile fauna in Port Nicholson, Wellington, New Zealand.—*Zoological Publications, Victoria University College* (19):1–22.

Department of Invertebrate Zoology, National Museum of Natural History, Smithsonian Institution, Washington, D.C. 20560.